

Conservation of Mass – Test it!

- Salt seems to “disappear” when it is stirred into water. Hmmmm.....
- Write a hypothesis to test whether the mass of salt is conserved during and after dissolution
- Identify your independent and dependent variable
- Write a detailed procedure
- Design a data table to record your results
 - What will you be measuring? How?

Conservation of Mass – Test it!

- Decide how long your experiment will last
 - Ex: 1 week, until all the water has evaporated, until the cup is empty, etc. ...
- Materials:
 - Plastic Cup
 - Water,
 - Sodium Chloride, NaCl (table salt)
 - Balance
 - Teaspoon

Conservation of Mass Experiment

- THE RESULTS ARE IN!!!
 - YOUR EXPERIMENT IS FINISHED WHEN THE CUP OF SALT IS DRY
 - CONFIRM THAT IT IS DRY WHEN AT LEAST 2 MEASUREMENTS MATCH EACH OTHER
- NOW IT'S TIME TO INTERPRET YOUR RESULTS, FORM CONCLUSIONS, BRAINSTORM EXTENSIONS, AND COMMUNICATE YOUR STUDY IN A WRITTEN LAB REPORT AND CLASS DISCUSSION.

Conservation of Mass Experiment - NEXT STEPS:

- Interpretation/Discussion
 - Construct a line graph of your results with each measurement being one data point
 - Independent variable: X-axis (_____)
 - Dependent variable: Y-axis (_____)

Conservation of Mass Experiment - NEXT STEPS: DUE FRIDAY, 11/12

- Make revisions to your first copy of the lab report (attach it to the back of your new report)
 - Proper header and Title
 - Purpose
 - (new- just a few sentences describing the background for the study)
 - Hypothesis (identify your IV and DV)
 - Materials
 - Procedure
 - Results
 - Data Table

Conservation of Mass Experiment - NEXT STEPS:

- Interpretation/Discussion
 - Construct a line graph of your results with each measurement being one data point
 - Independent variable: X-axis: (DAY #)
 - Dependent variable: Y-axis:
 - (mass in grams of salt + water)
 - Describe your graph and its meaning in at least one paragraph. Think of this as “reading the graph out loud” – what information does it present?

11/10: Pre-class

- Take out your Conservation of Mass experiment notes
- Find and list the range in values from your experiment in terms of:
 1. # of days
 - Total # of days
 2. Measurements of saltwater mass
 - Highest # - smallest #

11/10 AP EnviSci Preclass

- Please turn in your Student Reflection Notes from yesterday to the basket up front
- Quiz (on your own paper):
 1. Summarize each of the following terms and describe a situation that could cause each:
 - Salinization
 - Erosion
 - Desertification
 2. Which of these three do you think would be the biggest problem for Pennsylvanians? Support your answer with reasons.

Conservation of Mass Experiment - NEXT STEPS:

- Interpretation/Discussion
 - Construct a line graph of your results with each measurement being one data point
 - Independent variable: X-axis: (DAY #)
 - Dependent variable: Y-axis:
 - (mass in grams of salt + water)
 - Describe your graph and its meaning in at least one paragraph. Think of this as “reading the graph out loud” – what information does it present?

Steps to making a graph: (copy these)

1. Identify your Independent Variable (x-axis) and Dependent Variable (y-axis)
2. Determine the variable range
3. Choose a scale
 - Fill up most of the paper
4. Number and label each axis
5. Plot the data points
6. Draw the graph
 - A “best-fit” line or curve – NOT simply “connecting the dots”!
7. Title the graph

Determining Scale

1

- Measurements should fill up 90% of the graph
 - < 10% of the page should be empty!
- Choose your scale *strategically* (smartly!)
 - Multiply the total # lines by 0.9
 - Your data should take up at least this much room on your graph
 - The SCALE needs to be written on your graph
 - Example: “5 lines = 1 Day”
 - The x and y axes CAN USE DIFFERENT SCALES!
 - You do not need to start with the number “0”

Determining Scale

2

1. Count the # of lines on the x-axis
2. Divide by the range of values (here: # days)
3. This is how many lines each day is “worth”
4. Round to a convenient number
5. Double-check before moving on!!!
 - Multiply your day “worth” (from 3 above) by the total # of days you need to plot.
 - Is this # bigger than the # of lines available on the graph paper? If so, it will not fit; try again.
 - Is this # less than the # of lines available? If so, divide by the # of lines available. Is it between 0.9 and 1.0? If not, repeat from #4.

Example!

- X-axis: 40 lines
 - 14 days
 - $40 \text{ lines} / 14 \text{ days} = 2.85 \text{ lines/day}$
 ROUND to 3 lines per day
 - $3 \text{ lines/day} * 14 \text{ days} = 42 \text{ lines}$. Will not fit.
 ROUND to 2.5 lines per day
 - $2.5 \text{ lines/day} * 14 \text{ days} = 35 \text{ lines}$
 - $35 \text{ lines} / 40 \text{ lines} = 0.875$...this is close enough to 0.9. Choose this scale and move on!
- Scale: (5 lines = 2 days)

Example!

- Y-axis: 40 lines
 - 25.6 grams of saltwater on the first day
 - 3.1 grams of salt on the last day
 - Range: $25.6 - 3.1 = 22.5 \text{ g}$
 - $40 \text{ lines} / 22.5 \text{ g} = 1.78 \text{ lines / gram}$
 ROUND to 1.5 lines / gram
 - $1.5 \text{ lines/gram} * 22.5 \text{ grams} = 33.75 \text{ lines}$
 - $33.75 \text{ lines} / 40 \text{ lines} = 0.84$...not good enough
 ROUND to 1.75 lines / gram
 - $1.75 \text{ lines/gram} * 22.5 \text{ grams} = 39.4 \text{ lines}$
 - $39.4 \text{ lines} / 40 \text{ lines} = 0.98$. GREAT! ☺ This will fill 98% of the graph. (7 lines = 4 grams)

Practice: Whiteboarding

1

- X-axis:
 - 10 days
- Y-axis:
 - 22.5 grams of saltwater on the first day
 - 3.5 grams of salt on the last day
 - Range: $22.5 - 3.5 = 19 \text{ g}$

Practice: Whiteboarding

1

- X-axis:
 - 10 days
 - $40/10 = 4 \text{ lines per day}$
 - SCALE: 4 lines = 1 day
- Y-axis:
 - 22.5 grams of saltwater on the first day
 - 3.5 grams of salt on the last day
 - Range: $22.5 - 3.5 = 19 \text{ g}$
 - $40/19 = 2.1$ ROUND to 2
 - SCALE: 2 lines = 1 gram.
 - Start at 3 or 3.5

Practice! Whiteboarding

2

- X-axis:
 - 8 days
- Y-axis:
 - 12.4 grams of saltwater on the first day
 - 2.5 grams of salt on the last day

Practice! Whiteboarding

2

- X-axis:
 - 8 days
 - $40/8 = 5 \text{ lines per day}$
 - Scale: 5 lines = 1 day
- Y-axis:
 - 12.4 grams of saltwater on the first day
 - 2.5 grams of salt on the last day
 - $12.4 - 2.5 = 9.9$
 - $40/9.9 = 4.1$, ROUND TO 4
 - Scale: 4 lines = 1 gram
 - DON'T START AT ZERO OR IT WON'T FIT!!!

Make YOUR graph!

- Remember to leave room to draw your axes, labels, numbers and scale!
- Use a ruler to make this high quality!

Conservation of Mass Experiment - NEXT STEPS:

- **Conclusion**
 - Based on your graph, figure out whether your cup gained salt, lost salt, or kept the same amount of salt
 - Was your hypothesis correct or incorrect? It's ok to be a little repetitive here- clearly summarize what you were testing and what actually happened.
 - Suggest possible reasons why this happened.

Conservation of Mass Experiment - NEXT STEPS:

- **Extension**
 - Discuss sources of error (what went wrong or was not *perfect*? If you could do this experiment again, what would you do differently?)
 - At least 3 things
 - Rank them – describe which is the biggest deal and which is the most minor.
 - Ask new questions – what are you curious about now?
 - At least 2 things
 - Think creatively! This is where science is the most fun ☺

Conservation of Mass Experiment - NEXT STEPS:

- **Put it all together! DUE FRIDAY, 11/12.**
 - Revise your first draft and ATTACH IT TO THIS FINAL (TYPED) COPY!
 - I will grade you based upon your progress
 - **Proofread!!!**
 - Get a 2nd or 3rd pair of eyes to check your work.
 - **Print it BEFORE CLASS!**
 - 10% off for each day late – including 11/5 after Ms. J firsts collects the papers.
 - You may use the computers here to print during advisory, NOT the beginning of class.